

## ZYMON 2 Firmware Data Sheet

### FEATURES

- \* Fits onto MZB-3 CPU Card.
- \* Fully Documented.
- \* Written by Bob Eldridge.
- \* 40 Page User Manual Available in Advance if Required.
- \* Manual Includes an Extensively Commented Listing, (Note This is not an Extra).
- \* Manual Includes EPROM Programmer Flowchart, also Useful Hints and Tips on Writing Machine Code.
- \* Supplied in 2K EPROM (5V Type).
- \* Cassette Routines Include Checksums to Flag Errors.
- \* Visual Confirmation of Cassette Save and Load Commands.
- \* EPROM Programming Routine Included. (Single Bytes or Complete Blocks, with Automatic Verify).
- \* Extremely Quick and Easy Breakpoint Command for stepping Through and Debugging Programs.
- \* "Warm Start" by Use of Non-Maskable Interrupt.
- \* Attempt to Run Programs in "FF" (Empty Memory Locations) Detected and Control Returned in an Orderly Manner.
- \* Calculates Relative Jumps to Aid Writing of Machine Code.

0005  
L, DE  
(HL)  
1B  
FF  
AZ F7  
A, 58  
01  
USH HL  
USH AF  
HL, 0768  
(TABLE)  
FETCH THE  
DOES IT EQUATE  
IF YES JUMP TO (FOUR  
TEST FOR DELIMITER?  
IF NO THEN JUMP TO  
LOAD ERROR CODE X  
JUMP TO (ERROR 2)  
(ERROR 1) STACK  
(ERROR 2) STACK  
POINT TO STRING  
PRINT "ERROR ("   
GET THE ERROR C  
TER TO VDU  
ERRO

- \* Numerous Useful Commands.
- \* Carefully Thought Out and Consistent Syntax, Avoids Errors and Crashes.
- \* 13 Error Codes, (Particularly Useful to Beginners).
- \* On Error Cursor is Repositioned in the Best Position to Correct Error.
- \* Runs in RAM at 4 MHz with no Wait States.
- \* Command Table Can Easily be Extended by the User Since ZYMON 2 Runs in RAM.
- \* Ideal for Interak 1 System.
- \* Very Low Cost Compared with Other Monitors.

### DESCRIPTION

ZYMON 2 is designed to permit the user to enter, run and de-bug machine code programs as easily and conveniently as possible; it contains various commands which are summarised on the next page. The User Manual for the firmware gives full details of the commands and examples of their use. (Command letters have a mnemonic significance, but note that the letter "O" has deliberately not been used because of its easy confusion with the number "0".)

At switch on ZYMON 2 cancels the power-on-jump (assuming one has taken place), and tests to find out if it is in EPROM at 0000 or at E000. If it is at E000, it transfers itself down to RAM at 0000 before it outputs the message "ENTER COMMAND". The command can be simply to load a program or data from tape, or to enter and debug a machine-code program.

## ZYMON 1 COMMAND SUMMARY

B	Burn an EPROM
C	Copy Memory up/down
E	Execute a Program, Set Breakpoint
F	Fill Memory
J	Calculate Relative Jump
L	Load Program From Tape
M	Modify/Examine Memory
P	Port Input/Output
R	Display User Register Contents
S	Save Program to Tape
T	Tabulate (List) Memory
V	Verify (Compare Two Memory Blocks)
Z	Zero User Register Contents

It is of course perfectly possible, and indeed in some cases desirable, to use a computer without the slightest thought about how the ZYMON 2 Monitor works. For example to load and run a Chess Program all you need know about ZYMON 2 is that you have to enter the command "L" to load, and "E addr" to run it, ("addr" being the start address of the program, which is stored automatically on the tape and displayed after a load).

The idea of being able to learn and understand the ZYMON 2 at the machine code level is merely a possibility offered to the user; it is not compulsory! Often in competing systems the full details of the Monitor Program are kept "secret" from the user. Bob Eldridge, the author of ZYMON 2, considers this attitude to be totally unreasonable, and therefore has included a fully commented listing in the Manual, for the use of professional software users, O.E.M.s, teachers etc. Note that the provision of this information is for the sole use of legitimate purchasers of ZYMON 2, it is not a licence to copy any of the routines for use elsewhere.

## ORDERING INFORMATION

The User Manual on its own should be ordered as "ZYMON 2 User Manual". The 2K EPROM should be ordered as "ZYMON 2 less Manual".

## SUMMARY OF SUBROUTINES INCLUDED IN ZYMON 2 MONITOR PROGRAM

<u>Addr</u>	<u>Name</u>	<u>Function</u>
0491	FETCH A	The A Register is loaded with the DAV valid tape data. It is also printed to (HL) and (HL+1) as ASCII/Hex.
04B1	SAVE A	The data in A is saved to tape as an 8 bit binary number. Also the ASCII/Hex. of the data is printed to (HL) and (HL+1).
04C9	DEC IX	The IX register is decremented by 1 and the flags are set to indicate the result.
04DA	BURN IT	The EPROM programmer is cycled once to burn the data which is assumed to be latched on its inputs.
04F2	DELAY B	A delay will occur which equals the contents of the B Reg times 1ms (using a 4MHZ clock).
0596	ASCHEX TO BIN	The ASCII/Hex. data from (HL) and (HL+1) is converted to an 8 Bit binary in the C register.

05B2 PRINT REGS	The ghost register set is printed to the VDU screen.
05E4 ZERO GHOSTS	The ghost registers are zeroed.
05EF PRINTSTRING 1	A string pointed to by HL is printed starting at address F2C1. The action is terminated by Hex. FF at the end of the string.
05F2 PRINTSTRING 2	A string pointed to by HL is printed starting at an address held in the DE register pair. Terminated by Hex. FF at the end of the string.
0602 SCROLL 1-23	Lines 1-23 are scrolled. Line 23 is then cleared.
0618 BIN-ASCHEX	The 8 bit binary in the C register is converted to two ASCII/hex. digits which are printed to address (HL) and (HL+1).
0635 RESTORE TRAP	The scratchpad saved trapped op-code is restored to the scratchpad saved address.
064B CHEX	The ASCII/hex. characters pointed to by the HL register pair are checked for valid ASCII hex. The number of characters expected is held in the B register.
067A DISP DE (DE)1	Printed starting at address F2E3 will be the ASCII/hex. of the DE register pair, followed by a space and then the ASCII/hex. of the data pointed to by the DE register pair.
067D DISP DE (DE)2	Printed starting at the address held in the HL register pair will be the ASCII/hex. of the DE register pair, following this a space is printed and then the data pointed to by the DE register pair is printed.
0694 DISP DE	The ASCII/hex. equivalent of the DE register pair is printed starting at the address pointed to by the HL register pair.
06A4 E PC	Printed to line 24 will be "E addr" where addr is the current contents of the ghost program counter.
06BB HL-DE	The DE register pair is subtracted from the HL register pair. Both DE and HL are restored and the flags show the result.
06C3 CVDU	The VDU screen is cleared.
06D7 CLINEND	Hex. 20 is written to the address pointed to by the HL register pair, 1 is added to HL and the process is repeated until the low 5 bits of the 1 register are all zero, i.e. line end on the VDU.
06E2 KBR	The keyboard port, (0) is read. If there is no strobe, i.e. no key, the A register is set to zero and the Z flag is set to one. If there is a strobe, the valid key is returned in the A register after the strobe is over. The zero flag=0 for a valid key.
06F0 MV24-23	The contents of line 24 on the VDU are moved to line 23 on the VDU.